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No. 9400091

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN

'PHAAO'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 31st *day of* August *in the year of our Lord one thousand nine hundred and* ninety-four.

Attest:

Kenneth A. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Gustavo Garcia
App. No. 10/769,207

REF
A6

FORM APPROVED: OMB 0581 0055 Expires: 7 1 91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine whether a plant variety protection certificate may be issued. The information is held confidential until certificate is issued (7 U.S.C. 2426).

1 NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
PIONEER HI-BRED INTERNATIONAL, INC.

2 TEMPORARY DESIGNATION OR EXPERIMENTAL NO.

3 VARIETY NAME
PHAA0

4 ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*
Research and Product Development Division
P. O. Box 85
Johnston, IA 50131-0085

5 PHONE *(Include area code)*
515/270-3300

FOR OFFICIAL USE ONLY

PVPO NUMBER
9400091

FILING
Date: Feb. 07, 1994
Time: 11:03 ☒ AM ☐ PM

6 GENUS AND SPECIES NAME
Zea Mays

7 FAMILY NAME (Botanical)
Gramineae

8 CROP KIND NAME *(Common Name)*
Corn

9. DATE OF DETERMINATION
February 4, 1991

FEES RECEIVED
Filing and Examination Fee: $2,325.00
Date: Feb. 3, 1994
Certificate Fee: $275.00
Date: Aug. 1, 1994

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
Corporation

11 IF INCORPORATED, GIVE STATE OF INCORPORATION
Iowa

12. DATE OF INCORPORATION
May 6, 1926

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Dr. Bruce D. McBratney
Research and Product Development Division
Pioneer Hi-Bred International, Inc.
P.O. Box 85, Johnston, IA 50131-0085
PHONE *(Include area code)* 515/270-3546

14 CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. ☒ Exhibit A, Origin and Breeding History of the Variety.
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety.
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.
f. ☒ Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office 1-31-94
g. ☒ Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)*
☐ YES *(If "YES," answer items 16 and 17 below)* ☒ NO *(If "NO," skip to item 18 below)*

16 DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☐ NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

18 DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THIS VARIETY IN THE U.S.?
☐ YES *(If "YES," through)* ☐ Plant Variety Protection Act ☐ Patent Act. Give date: _____
☒ NO

19 HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☐ YES (If "YES," give names of countries and dates)
☒ NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
PIONEER HI-BRED INTERNATIONAL, INC.		

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14A. Exhibit A. Origin and Breeding History

Pedigree: PHW03/PHJ40)X72242331

Pioneer line PHAA0, Zea mays L., a yellow corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross PHW03 x PHJ40 using the pedigree method of breeding. The progenitors of PHAA0 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing and selection were practiced within the above F1 cross for 6 generations in the development of PHAA0 at Grand Forks, ND. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Grand Forks, ND, as well as other other Pioneer research stations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations made for uniformity.

PHAA0 has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed 3 generations with careful attention paid to uniformity of plant type to assure genetic homozygousity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity.

No variant traits have been observed or are expected in PHAA0.

The criteria used in the selection of PHAA0 were yield, both per se and in hybrid combinations; kernel size, especially important in production; ability to germinate in adverse conditions; number of tillers, especially important in production because having numerous tillers increases hybrid production costs spent on detasseling; disease and insect resistance; pollen yield; tassel size; pollen shed duration.

DEVELOPMENTAL HISTORY FOR PAA0

SEASON/YEAR	INBREEDING LEVEL
Summer 1986	F0
Winter 1987	F1
Summer 1987	F2
Winter 1988	F3
Summer 1988	F4
Summer 1989	F5
Summer 1990	F6
Winter 1991	F7*
Summer 1991	F8
Winter 1992	F9
Summer 1992	F10*

*PHAA0 was selfed and selected through F7 generation.

**PHAA0 was selfed and ear-rowed from F8 through F10 generations.

14B. Exhibit B. Novelty Statement

PHAA0 is similar to the Pioneer Hi-Bred International, Inc. proprietary inbred line PHJ40 (PVP Certificate No. 8600133). PHAA0 has a slight tendency to develop two ears whereas PHJ40 develops only one ear per stalk. PHAA0 has few marginal waves and longitudinal creases compared to PHJ40 which has no marginal waves or longitudinal creases. PHAA0 has a tassel branch angle from the central spike of greater than 45 degrees whereas PHJ40 has a tassel branch angle from the central spike of less than 30 degrees. PHAA0 has light green fresh husk color whereas PHJ40 has dark green fresh husk color.

PHAA0 has higher yield and grain harvest moisture but lower test weight than PHJ40. PHAA0 has better seedling vigor and higher early stand count than PHJ40. PHAA0 has significantly better brittle stalk resistance than PHJ40.

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EXHIBIT NO. C

VARIETY DESCRIPTION INFORMATION

INBRED = PHAA0

Type: Dent Region Best Adapted: Most Regions

A. Maturity: Average across maturity zones. Zone : 0

Heat Unit Shed: 1210
Heat Unit Silk: 1220
No. Reps: 19

$$\text{HEAT UNITS} = \frac{[\text{Max.Temp. } (\leq 86^\circ\text{F.}) + \text{Min. Temp } (\geq 50^\circ\text{F.})]^*}{2} - 50$$

* If maximum is greater than 86 degrees fahrenheit, then 86 is used and if minimum is less than 50, then 50 is used. Heat units accumulated daily and can not be less than 0.

B. Plant Characteristics:

Plant height (to tassel tip): 196 cm
Length of top ear internode: 12 cm
Number of ears per stalk: Slight two ear tendency.
Ear height (to base of top ear): 65 cm
Number of tillers: None
Cytoplasm type: Normal

C. Leaf:

Color: (B14) Dark Green
Angle from Stalk: 30 - 60 degrees
Marginal Waves: (WF9) Few
Number of Leaves (mature plants): 17
Sheath Pubescence: (W22) Light
Longitudinal Creases: (OH56A) Few
Length (Ear node leaf): 69 cm
Width (widest point, ear node leaf): 9 cm

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D. Tassel:

Number lateral branches: 3
Branch Angle from central spike: > 45 degrees
Pollen Shed: light based on Pollen Yield Test
(69% of experiment means)
Peduncle Length (top leaf to basal branches): 18 cm
Anther Color: Yellow
Glume Color: Green

E. Ear (Husked Ear Data Except When Stated Otherwise):

Length: 15 cm
Weight: 132 gm
Mid-point Diameter: 24 mm
Silk Color: Yellow
Husk Extension (Harvest stage): Medium (barely covering ear)
Husk Leaf: Short (< 8 cm)
Taper of Ear: Average
Position of Shank (dry husks): Upright
Kernel Rows: Straight Distinct Number = 14
Husk Color (fresh): Light Green
Husk Color (dry): Buff
Shank Length: 16 cm
Shank (No. of internodes): 8

F. Kernel (Dried):

Size (from ear mid-point)
Length: 12 mm
Width: 8 mm
Thick: 5 mm
Shape Grade (% rounds): 20-40% (29% medium round based on Parent Test Data)
Pericarp Color: Colorless
Aleurone Color: Homozygous Yellow
Endosperm Color: Yellow
Endosperm Type: Normal Starch
Gm Wt/100 Seeds (unsized): 30 gm

G. Cob:

Diameter at mid-point: 24 mm
Strength: Strong
Color: Red

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H. Diseases:

Common Rust (*P. sorghi*): Intermediate
Stewart's Wilt (*E. stewartii*): Resistant
Head Smut (*S. reiliana*): Higly Resistant
Fusarium Ear Mold (*F. moniliforme*): Higly Resistant
Gibberella Ear Rot (*G. zeae*): Susceptible

I. Insects:

European Corn Borer-1 Leaf Damage (Pre-flowering): Intermediate

The above descriptions are based on a scale of 1-9, 1 being highly susceptible, 9 being highly resistant.

S (Susceptible): Would generally represent a score of 1-3.
I (Intermediate): Would generally represent a score of 4-5.
R (Resistant): Would generally represent a score of 6-7.
H (Highly Resistant): Would generally represent a score of 8-9. Highly resistant does not imply the inbred is immune.

J. Variety Most Closely Resembling:

Character	Inbred
Maturity	PHJ40
Usage	PHJ40

PHJ40 (PVP Certificate No. 8600133) is a Pioneer Hi-Bred International, Inc. proprietary inbred.

Data for Items B, C, D, E, F, and G is based primarily on a maximum of two reps from Johnston, Iowa grown in 1992, plus description information from the maintaining station.

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CLARIFICATION OF DATA IN EXHIBITS C AND D

Please note the data presented in Exhibit C, "Objective Description of Variety," is data collected primarily at Johnston, Iowa plus description information from the maintaining station. The data in Exhibit D, "Additional Description of Variety," is data from comparisons of inbreds or hybrids grown in the same tests in the adapted growing area of PHAA0.

EXHIBIT D. ADDITIONAL DESCRIPTION OF PHAAO.
INDRED PER SE YIELD COMPARISON OF PHAAO AND PHJ40 EVALUATED OVER THREE YEARS.

VARIETY #1 - PHAAO
VARIETY #2 - PHJ40

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	TST WT ABS	BAR PLT ABS	SDG VGR ABS	EST CNT ABS	DRP EAR ABS	GDU SHD ABS	GDU SLK ABS	GRN APP ABS	STA GRN ABS	STK LDG ABS	RT LDG ABS	BRT STK ABS
91	1	73.7	117	18.0	58.7	95.7	5.8	47.7	99.8	1181	1183	6.7	6.5	94.1	98.1	99.6
	2	58.1	93	17.8	59.0	94.3	5.3	45.2	99.8	1175	1188	5.8	5.5	94.6	98.3	99.5
	LOCS	10	10	12	10	19	4	23	7	20	16	5	1	7	4	2
	REPS	26	26	28	26	21	5	34	20	32	20	12	2	20	10	4
	PROB	.000#	.000#	.831	.554	.459	.731	.043+	.903	.362	.088*	.101		.869	.714	.500
92	1	90.8	110	20.1	55.2	98.5	6.4	47.1	99.7	1177	1196	5.7	4.4	99.2	97.4	100.0
	2	80.8	99	18.6	58.2	98.1	5.5	45.5	99.8	1163	1187	5.7	4.0	99.3	96.4	97.7
	LOCS	12	12	15	12	8	12	44	6	36	33	5	7	9	2	2
	REPS	54	54	52	51	19	29	104	12	49	40	10	15	22	4	3
	PROB	.048+	.054*	.002#	.001#	.769	.005#	.023+	.363	.040+	.048+	.000#	.209	.794	.500	.500
93	1	64.8	114	19.6	55.9	94.8	5.9	42.1	99.7	1190	1208	6.2	4.2	97.5	100.0	97.7
	2	55.8	95	18.7	57.5	94.3	5.6	42.6	99.7	1197	1210	6.2	4.2	96.2	98.9	93.7
	LOCS	13	13	20	14	28	12	37	7	25	23	5	7	14	2	8
	REPS	54	54	59	53	62	27	114	14	40	36	10	22	40	4	10
	PROB	.002#	.001#	.009#	.001#	.761	.309	.670	.936	.307	.832	.000#	.982	.101	.500	.008#
TOTAL SUM	1	76.3	113	19.4	56.4	95.6	6.1	45.4	99.7	1182	1197	6.2	4.4	97.2	98.4	98.4
	2	65.0	96	18.4	58.1	94.9	5.5	44.4	99.8	1176	1195	5.9	4.2	96.8	97.9	95.3
	LOCS	35	35	47	36	55	28	104	20	81	72	15	15	30	8	12
	REPS	134	134	139	130	102	61	252	46	121	96	32	39	82	18	17
	DIFF	11.2	18	0.9	1.7	0.8	0.6	1.0	0.1	06	0.2	0.3	0.3	0.4	0.5	3.1
	PROB	.000#	.000#	.000#	.000#	.455	.018+	.076*	.698	.161	.525	.364	.415	.547	.255	.005#

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DEFINITIONS

In the description and examples, a number of terms are used herein. In order to provide a clear and consistent understanding of the specification and claims, including the scope to be given such terms, the following definitions are provided:

BAR PLT = BARREN PLANTS. This is the percent of plants per plot that were not barren (lack ears).

BRT STK = BRITTLE STALKS. This is a measure of the stalk breakage near the time of pollination, and is an indication of whether a hybrid or inbred would snap or break near the time of flowering under severe winds. Data are presented as percentage of plants that did not snap.

BU ACR = YIELD (BUSHELS/ACRE). Actual yield of the grain at harvest adjusted to 15.5% moisture. ABS is in absolute terms and % MN is percent of the mean for the experiments in which the hybrid or inbred was grown.

DRP EAR = DROPPED EARS. This is a measure of the number of dropped ears per plot and represents the percentage of plants that did not drop ears prior to harvest.

EAR HT = EAR HEIGHT. The ear height is a measure from the ground to the top developed ear node attachment and is measured in centimeters.

EST CNT = EARLY STAND COUNT. This is a measure of the stand establishment in the spring and represents the number of plants that emerge on a per plot basis for the hybrid or inbred.

GDU SHD = GDU TO SHED. The number of growing degree units (GDUs) or heat units required for an inbred line or hybrid to have approximately 50 percent of the plants shedding pollen and is measured from the time of planting. Growing degree units are calculated by the Barger Method, where the heat units for a 24-hour period are:

$$GDU = \frac{(\text{Max. temp.} + \text{Min. temp.})}{2} - 50$$

The highest maximum temperature used is 86°F and the lowest minimum temperature used is 50°F. For each inbred or hybrid it takes a certain number of GDUs to reach various stages of plant development.

GDU SLK = GDU TO SILK. The number of growing degree units required for an inbred line or hybrid to have approximately 50 percent of the plants with silk emergence from time of planting. Growing degree units are calculated by the Barger Method as given, in GDU SHD definition.

GRN APP. = GRAIN APPEARANCE. This is a 1 to 9 rating for the general quality of the shelled grain as it is harvested based on such factors as the color of the harvested grain, any mold on the grain, and any cracked grain. High scores indicate good grain quality and low scores indicate poor grain quality.

MST = HARVEST MOISTURE. The moisture is the actual percentage moisture of the grain at harvest.

PLT HT = PLANT HEIGHT. This is a measure of the height of the plant from the ground to the tip of the tassel in centimeters.

RT LDG = ROOT LODGING. Root lodging is the percentage of plants that do not root lodge; plants that lean from the vertical axis at an approximately 30° angle or greater would be counted as root lodged.

SDG VGR = SEEDLING VIGOR. This is the visual rating (1 to 9) of the amount of vegetative growth after emergence at the seedling stage (approximately five leaves). A higher score indicates better vigor and a low score indicates poorer vigor.

STA GRN = STAY GREEN. Stay green is the measure of plant health near the time of black layer formation (physiological maturity). A high score indicates better late-season plant health.

STK LDG = STALK LODGING. This is the percentage of plants that did not stalk lodge (stalk breakage) as measured by either natural lodging or pushing the stalks and determining the percentage of plants that break below the ear.

TST WT = TEST WEIGHT UNADJUSTED. The measure of weight of the grain in pounds for a given volume (bushel).

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14E. EXHIBIT E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of PHAA0. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of PHAA0.